A refrigerating system (2) according to the invention comprises a refrigeration cycle having a compressor (4), a condenser (6), a collecting container (10), an expansion device (16), an evaporator (18) and refrigerating circuits circulating a refrigerant therethrough; a by-pass line (20) comprising a by-pass valve (22), the by-pass line (20) connecting the gas space of the collecting container (10) with the suction line of the compressor (4); and a control unit that in operation allows switching between normal operation of the refrigerating cycle and refrigerant collecting operation in which the by-pass valve (22) is open and reduces the liquefying pressure in the condenser (6) such that the remaining liquid refrigerant in the condenser (6) is evaporated and led into the collecting container (10).
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Refrigerating System and Method for Operating the Same

The invention is directed to a refrigerating system, and to a method for operating a refrigerating system.

Conventional refrigerating systems include a refrigerating cycle having a compressor, a condenser, a collecting container, an expansion valve, an evaporator and refrigerating circuits circulating a refrigerant like fluorocarbon or chlorofluorocarbon therethrough. Such refrigerants are often harmful to the environment, and thus it has become obligatory to monitor the amount of such refrigerants in refrigerating systems in predetermined intervals in order to document the leak tightness of such refrigerating systems and to detect existing leaks at an early stage.

With some conventional refrigerating systems the amount of refrigerant contained in the collecting container can be measured, but such measurements are often inaccurate, and the deviation of the measured amount of refrigerant from the actual amount is often about 3% - 6% which is too much having regard that according to the so-called "F-Gase Verordnung" leakage ratios of 2% per year may not exceed.

It is therefore an object of the invention to provide a refrigerating system that allows for a more precise measurement of the amount of refrigerant contained therein.

Exemplary embodiments of the invention include a refrigerating system comprising a refrigerating cycle having a compressor, a condenser, a collecting container, an expansion device, an evaporator and refrigerating circuits circulating a refrigerant therethrough; a by-pass line comprising a by-pass valve, the by-pass line connecting the gas space of the collecting container with the suction line of the compressor; and a control unit that in operation allows switching between normal operation of the refrigerating cycle and refrigerant col-
lecting operation in which the by-pass valve is open and the condenser is heated by hot gas and reduces the liquefying pressure in the condenser such that the remaining liquid refrigerant in the condenser is evaporated and led into the collecting container.

Further exemplary embodiments of the invention include a refrigerating system comprising a refrigerating cycle having a compressor, a condenser, a collecting container, an expansion device, an evaporator and refrigerating circuits circulating a refrigerant therethrough; a liquefying set connected to the collecting container; a control unit that in operation allows switching between normal operation of the refrigerating cycle and refrigerant collecting operation in which the liquefying set cools the collecting container and reduces the temperature in the condenser below the ambient temperature thereby evaporating the remaining liquid refrigerant in the condenser and leading it into the collecting container.

Further exemplary embodiments of the invention include a method for operating a refrigerating system in a refrigerant collecting operation, the refrigerating system comprising a refrigerating cycle having a compressor, a condenser, a collecting container, an expansion device, an evaporator and refrigerating circuits circulating a refrigerant therethrough, the method comprising the steps of: running the compressor; connecting the gas space of the collecting container with the suction line of the compressor via a by-pass valve; heating the condenser by hot gas and keeping the liquefying pressure in the condenser so low that no condensation is effected in the condenser thereby evaporating the remaining liquid refrigerant in the condenser and leading it into the collecting container.

Further exemplary embodiments of the invention include a method for operating a refrigerating system in a refrigerant collecting operation, the refrigerating system comprising a refrigerating cycle having a compressor, a condenser, a collecting container, an expansion device, an evaporator and refrigerating circuits circulating a refrigerant therethrough, the method comprising the step of: running the liquifying set thereby cooling the collecting container and reducing the temperature in the condenser below the ambient temperature such that the
remaining liquid refrigerant in the condenser is evaporated and led into the collecting container.

Embodiments of the invention are described in greater detail below with reference to the figures, wherein:

Figure 1 shows a schematic diagram of a first refrigerating system according to a first embodiment of the invention;

Figure 2 shows a second refrigerating system according to a second embodiment of the invention; and

Figure 3 shows a third refrigerating system according to a third embodiment of the invention.

Figure 1 shows a first refrigerating system 2 comprising a main refrigerating cycle and a by-pass line 20 having a by-pass valve 22 arranged therein.

The main refrigerating cycle comprises, in flowing direction of the refrigerant, a compressor 4, a condenser 6, an optional nonreturn valve 8, a collecting container 10 provided with a capacitive refrigerant fill level measuring unit 12, a solenoid valve 14, an expansion valve 16, an evaporator 18 and refrigerating circuits connecting these elements and circulating a refrigerant therethrough.

In the exemplary embodiment of Fig. 1, the condenser 6 is provided with two fans flowing air over the surface of the condenser for effecting heat exchange between the air and the refrigerant flowing through the condenser 6. Generally, the condenser 6 can be supplied with at least one fan or an arbitrary number of fans.

In particular, the air flowing over the surface of the condenser 6 is heated, wherein the refrigerant flowing through the condenser 6 is condensed/liquefied.
Likewise, in the exemplary embodiment of Fig. 1 the evaporator 18 is provided with a fan for effecting heat exchange between the refrigerant flowing through the evaporator 18 and the air flowing over the surface of the evaporator 18. Generally, the evaporator 18 can be supplied with at least one fan or an arbitrary number of fans. In particular, the air flowing over the surface of the evaporator 18 is cooled whereas the refrigerant flowing through the evaporator 18 is heated and evaporated.

In normal operation of the collecting container 10 condensed liquid refrigerant collects in the lower part thereof, wherein gaseous refrigerant is present in its upper part, which is also referenced as gas space of the collecting container 10.

The bypass line 20 connects the gas space of the collecting container 10, particularly the top of the collecting container 10 with the suction line of the compressor 4. By means of the bypass valve 22, which can be a solenoid valve or any other appropriate valve, the bypass line 20 can be opened or closed.

The compressor 4, the valves 14 and 22 and preferably also the fans of the condenser 6 and the evaporator 18 are controlled by a control unit (not shown).

In normal operation of the first refrigerating system 2 the solenoid valve 14 is open and the bypass valve 22 is closed, and the compressor 4, the condenser 6 and the evaporator 18 are running.

In order to perform a precise measurement of the refrigerant contained in the first refrigerating system 2, the control unit switches the refrigerating system 2 from normal operation to refrigerant collecting operation as follows:

At first, the solenoid valve 14 is closed and the compressor 4 sucks off the refrigerant remaining in the portion of the first refrigerating cycle 2 between the solenoid valve 14 and the compressor 4, especially in the expansion valve 16, in the evaporator 18 and in the refrigerant conduits between the solenoid valve 14 and the compressor 4, until no liquid refrigerant remains in this portion.
Subsequently, the bypass valve 22 is opened, and gaseous refrigerant flows from the gas space of the collecting container 10 to the compressor 4, where it is compressed and led to the condenser 6. In this way the condenser 6 is heated with hot gaseous refrigerant and the remaining portion of liquid refrigerant in the condenser 6 is evaporated and flows to the collecting container 10. By this refrigerant collecting operation the collecting container 10 becomes the coldest place within the cycle, in particular within the high-pressure portion of the first refrigerating system 2. The high-pressure portion of the first refrigerating cycle 2 is formed by the portion between the compressor 4 and the expansion device 16. It is a physical phenomenon applied by the inventor to the refrigerating system and method according to the invention that refrigerant is always led to the coldest place within the cycle.

When operating the first refrigerating system 2 in the refrigerant collecting operation, the performance of the compressor 4 can be reduced.

The refrigerant remaining in the condenser 6 and the refrigerant conduits is now in gaseous form. By this exemplary embodiment of the invention, it is ensured that no liquid refrigerant remains in the condenser 6, thereby improving the preciseness of the measuring results significantly.

Having evaporated the remaining liquid refrigerant in the condenser 6, all the liquid refrigerant is collected in the collecting container 10. The remaining refrigerant in the condenser 6 and the refrigerant conduits is gaseous.

Now the fill level of the refrigerant in the collecting container 10 can be measured by the capacitive refrigerant fill level measuring unit 12 and such measurement produces a very precise and reliable result. The capacitive refrigerant fill level measuring unit 12 is especially pressure and temperature compensated. Alternatively, the collecting container 10 could be set to a defined pressure or temperature as well.
In this exemplary embodiment the refrigerant fill level measuring unit 12 is of capacitive kind. As a matter of course, other methods and devices for measuring the refrigerant fill level within the collecting container 10 can also be provided. The deviation of the actual amount of refrigerant contained in the first refrigerating system 2 from the measured amount of refrigerant collected in the collecting container 10, especially the amount of gaseous refrigerant that remains in the refrigerant conduits and in the condenser 6 is negligible and can be calculated.

By means of the optional non-return valve 8 which can also be omitted a backflow of refrigerant into the condenser 6 is avoided when performing the refrigerant collecting operation.

Having measured the amount of refrigerant in the collecting container 10 the control unit switches the first refrigerant system 2 into the normal operation mode again by closing the bypass valve 22 and by opening the shut off valve 14 again. In case the performance of the compressor 4 has been reduced, it is again increased to normal performance.

In the exemplary embodiment of Fig. 1 only one compressor 4, one condenser 6 and one evaporator 18 are depicted. As a matter of course, also a set of compressors, a plurality of condensers, a plurality of expansion valves and a plurality of evaporators can be provided.

Fig. 2 shows a schematic diagram of a second refrigerating system 24 comprising the main refrigerant cycle according to the first refrigerant system 2 and further comprising a liquefying set 34 for cooling gaseous refrigerant from the collecting container 10.

The liquefying set 34 comprises an additional compressor 36, an additional condenser 38, an additional expansion device 40 and a heat exchanger 28 being connected to a gaseous refrigerant line 26 coming from the gas space of the collecting container 10 and to a liquid refrigerant return line 30 connecting...
to the collecting container 10. Optionally, a siphon 32 can be arranged within the liquid refrigerant return line 30.

By means of the liquefying set 34 the collecting container 10 is cooled in order to become the coldest place on the high-pressure side of the second refrigerating system 24.

In normal operation of the second refrigerating system 24, the solenoid valve 14 is open, the compressor 4, the condenser 6 and the evaporator 18 are running, and the liquefying set 34 stands still.

The compressor 4, the condenser 6, the solenoid valve 14, the evaporator 18, the additional compressor 36 and the additional condenser 38 are controlled by a control unit (not shown).

In order to perform a precise measurement of the refrigerant contained in the second refrigerating system 24 the control unit switches the refrigerating system 24 from normal operation to refrigerant collecting operation as follows:

At first the solenoid valve 14 is closed and the compressor 4 sucks off the refrigerant remaining in the portion of the refrigerating cycle between the solenoid valve 14 and the compressor 4, especially in the expansion valve 16, in the evaporator 18 and in the refrigerant conduits between the solenoid valve 14 and the compressor 4, until no liquid refrigerant remains in this portion.

Subsequently, the compressor 4 and the condenser 6 are stopped and the liquefying set 34, particularly its additional compressor 36 and its additional condenser 38, is/are started. Alternatively, the liquefying set 34 can also be started during suck-off operation of the refrigerant remaining in the portion of the refrigerating cycle between the solenoid valve 14 and the compressor 4.

Now the refrigerant in the liquefying set 34 is compressed by the additional compressor 36, condensed by the additional condenser 38 and expanded and
evaporated by the expansion valve 40. Consequently a natural cycle is effected on the collecting container side as follows:

Gaseous refrigerant is sucked from the gas space of the collecting container 10 through the gaseous refrigerant line 26 into the heat exchanger 28. In the collecting container side of the heat exchanger 28, the refrigerant of the main cycle is cooled down against the refrigerant of the liquefying set 34 and thus condensed. In the siphon 32 of the liquid refrigerant return line 30 a liquid fill level is formed, particularly in an upper portion of the siphon 32.

By this cooling operation of the liquefying set 34 the collecting container 10 becomes the coldest place on the high-pressure side, the evaporating pressure and, respectively, temperature of the refrigerant within the condenser 6 is reduced significantly below the ambient temperature thus the remaining portion of liquid refrigerant within the condenser 6 is evaporated and led completely into the collecting container 10.

Now the whole amount of liquid refrigerant is collected in the collecting container 10 and there is no more liquid refrigerant remaining in the condenser 6.

At this stage of procedure the fill level of the refrigerant in the collecting container 10 can be measured by the capacitive refrigerant fill level measuring unit 12, and such measurement produces a very precise and reliable result. The amount of gaseous refrigerant remaining in the rest of the second refrigerating system 24 is negligible and can be determined by calculation.

Having measured the amount of refrigerant in the collecting container 10 and, if desired, having determined the amount of gaseous refrigerant remaining in the second refrigerating system 24, the control unit stops the operation of the liquefying set 34 and switches the second refrigerating system 24 into the normal operation mode again by opening the solenoid valve 14 and by starting the compressor 4, the condenser 6 and the evaporator 18 again.
Fig. 3 shows a schematic diagram of a third refrigerating system 42 comprising the main refrigerating cycle according to the first refrigerating system 2 and further comprising a liquefying set 44.

Differently from the liquefying set 34 of the second refrigerating system 24, the liquefying set 44 of Fig. 3 is connected directly to the collecting container 10 without the provision of a heat exchanger. In particular, a gaseous refrigerant line 46 connects the gas space of the collecting container 10, particularly the top portion of the collecting container 10 with the additional compressor 48 and forms its suction line, and the liquid refrigerant return line 54 connects the expansion device 52 to the collecting container 10. The liquid refrigerant return line 54 also comprises a siphon 56 arranged therein.

The input lines of both siphons 32 and 56 of Figs. 2 and 3 are on a higher level as compared to their output lines.

In normal operation of the third refrigerating system 42, the compressor 4, the condenser 6 and the evaporator 18 are running, the solenoid valve 14 is open, and the liquefying set 44 stands still.

In order to allow for a precise measurement of the refrigerant contained in the third refrigerating system 42, the control unit switches it from normal operation into refrigerant collecting operation as follows:

At first the solenoid valve 14 is closed and the compressor 4 sucks off the remaining refrigerant in the portion between the solenoid valve 14 and the compressor 4. Subsequently, the compressor 4 is stopped and the liquefying set 44 is started. Gaseous refrigerant is sucked from the gas space of the collecting container 10 through the gaseous refrigerant line 46 into the compressor 48, compressed therein, condensed against ambient air in the condenser 50 and expanded in the expansion device 52, and the cooled refrigerant is fed back into the collecting container 10. Consequently, the collecting container 10 is cooled and becomes the coldest place on the high-pressure side, the evaporating pressure and, respectively, temperature of the refrigerant in the condenser.
6 is reduced significantly below the ambient temperature. By this way the remaining portion of liquid refrigerant within the condenser 6 is evaporated and led into the collecting container 10.

In the end, all liquid refrigerant is collected within the collecting container 10, and in the remaining portions of the third refrigerating system 42 only gaseous refrigerant is present.

Now the fill level of the refrigerant in the collecting container 10 can be measured by the capacitive refrigerant fill level measuring unit 12 and the amount of gaseous refrigerant in the remaining portions of the third refrigerating system 42, which is negligible, can be determined by calculation. Such measurement and calculation produce very precise and results.

Having determined the amount of refrigerant the control unit stops the operation of the liquefying set 34 and switches the third refrigerating system 42 into normal operation mode again by opening the solenoid valve 14, by starting the compressor 4, the condenser 6 and the evaporator 18 again.

In the exemplary embodiments of Fig. 2 and 3 only one additional compressor 36, 48 and one additional condenser 38, 50 are depicted. As a matter of course, also a set of compressors and a plurality of condensers can be provided.

In all three refrigerating systems 2, 24 and 42 the valves 14 and 16 can be formed as a respective common valve 14, for example as electronic expansion valve. In this case the valve 16 can be omitted.

The methods for collecting refrigerant in the refrigerating systems as described with respect to Fig. 1, 2 and 3 can be combined as well. Particularly the collecting container 10 can be placed close to the condenser 6 and also outside.

Existing refrigerating system can easily be retrofitted with a bypass line 20 according to Fig. 1 and with liquefying sets 34 and 44 according to Fig. 2 and 3.
Exemplary embodiments of the invention, as described above, allow for a precise measurement of the refrigerant actually contained in the refrigerating system. The refrigerating systems according to the embodiments of the invention, as described above, are suitable for use with any refrigerant, especially with fluorocarbon or chlorofluorocarbon refrigerants. The automated monitoring can be effected easily and reliably by the refrigerating system. According to embodiments of the invention, as described above, the efforts needed for such monitoring are substantially reduced, and leakages in the refrigerating cycle can be detected at an early stage. The switching between normal operation and refrigerant collecting operation and the actual measurement can be effected very fast.

The deviation of the actual amount of the refrigerant to the measured amount of refrigerant of less than 2% can reliably be detected. Even much higher preciseness is attained. Consequently, by the refrigerant systems according to exemplary embodiments of the invention, as described above, the requirements of the so called F-Gase Verordnung can be matched.

Existing refrigeration cycles can easily be retrofitted with the elements needed for the refrigerant collecting operation, as described above.

Although the elements of the refrigerating system may be positioned in an arbitrary environment, in one embodiment of the invention, the collecting container can be positioned near the condenser, especially outdoor.

The control unit can by any kind of control or computer being capable of controlling the above mentioned elements.

According to a finding of the inventor which is put into practice by the refrigerating systems and methods according to exemplary embodiments of the invention the collecting container becomes the coldest place within the high-pressure portion of the refrigerating system, and the evaporating pressure and, respectively, temperature within the condenser is controlled such that the re-
maining portion of liquid refrigerant in the collecting container is evaporated and led into the collecting container. Hence, all liquid refrigerant in the refrigerating system is collected in the collecting container and can be reliably measured. The amount of remaining gaseous refrigerant in the rest of the refrigerating system is negligible and can be determined by calculation if desired.

In one compact, easy to retrofit and cost effective embodiment of the invention the refrigerant collecting operation is effected by a bypass line having a bypass valve arranged therein.

In an alternative embodiment which ensures particularly precise measurements a separate liquefying set is coupled to the collecting container in order to cool the collecting container and to reduce the temperature in the condenser below the ambient temperature thereby evaporating the remaining liquid refrigerant in the condenser and leading it into the collecting container.

In one embodiment of the invention, the liquefying set comprising an additional compressor, an additional condenser and an additional expansion device is connected directly to the collecting container.

In an alternative embodiment, the liquefying set comprising an additional compressor, an additional condenser and an additional expansion device is coupled to the collecting container, in particular to a cycle line of the collecting container, by means of a heat exchanger.

By the provision of a siphon in the liquid refrigerant return line of the liquefying set it is ensured that only liquid refrigerant is fed back into the collecting container.

For switching between normal operation and refrigerant collecting operation at least one shut off valve, especially a solenoid valve can be provided. Such shut off valves can be solenoid valves or any other valves having an arbitrary control or drive and being capable of interrupting and reasserting refrigerant flow within a refrigerant conduit. In the embodiment comprising the bypass line, the by-
pass valve can be formed as shut off valve. The switching operation of the shut off valve or the shut off valves is controlled by the control unit. Particularly such control unit controls all existing shut off valves.

According to an embodiment of the invention, the collecting container is provided with a refrigerant fill level measuring unit, which can be formed as capacitive measuring unit measuring a floater swimming at the surface of the liquid refrigerant collecting in the collecting container. Other refrigerant fill level measuring units can be employed as well.

Exemplary embodiments of the method for operating a refrigerating system in a refrigerant collecting operation, as described above, allow for a reliable collection of the whole amount of liquid refrigerant in the collecting container and for a precise measurement of such liquid refrigerant. When employing a bypass line, the compressor is running, the gas space of the collecting container is connected with a suction line of the compressor via a bypass valve, and the liquefying pressure in the condenser is kept so low that no condensation is effected in the condenser and thereby any liquid refrigerant in the condenser is evaporated and led into the collecting container. This method is easy to carry out and produces reliable results.

When employing a liquefying set, the collecting container is cooled and the temperature in the condenser is reduced below the ambient temperature such that the remaining liquid refrigerant in the condenser is evaporated and led into the collecting container. By such method particularly precise measurement results can be obtained.

When a shut off valve positioned in flowing direction before the expansion device is closed and the refrigerant remaining between the shut off valve and the compressor is sucked off by the compressor at the beginning of the method, the preciseness can be improved even further.

When employing a separate liquefying set, the compressor can be switched off during refrigerant collecting operation.
The same embodiments, features and related advantages as have been described with respect to the refrigerating system can also be realized in the method for operating a refrigerating system in a refrigerant collecting operation in terms of corresponding method steps. In order to avoid redundancy, such embodiments, features and advantages are not repeated here.

The refrigerating system and the method for its operation according to embodiments of the invention, as described above, are suitable in combination with any compression cycle effecting refrigeration of the evaporator/cold consumers at temperatures of above 0 degrees Celsius and freezing temperatures of below 0 degrees Celsius.

While the invention has been described with reference to exemplary embodiments, it will be understood by those skilled in the art that various changes may be made and elements may be substituted for equivalents thereof without departing from the scope the invention. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the essential scope thereof. Therefore, it is intended that the invention not be limited to the particular embodiments disclosed, but that invention will include all embodiments falling within the scope of the appended claims.
List of Reference Numerals

2  first refrigerating system
5 4  compressor
6 6  condenser
8 8  nonreturn valve
10 10  collecting container
12 12  refrigerant fill level measuring unit
14 14  valve
16 16  expansion device
18 18  evaporator
20 20  by-pass line
22 22  by-pass valve
24 24  second refrigerating system
26 26  gaseous refrigerant line
28 28  heat exchanger
30 30  liquid refrigerant return line
32 32  siphon
34 34  liquefying set
36 36  compressor
38 38  condenser
40 40  expansion device
42 42  third refrigerating system
44 44  liquefying set
46 46  gaseous refrigerant line
48 48  compressor
50 50  condenser
52 52  expansion device
54 54  liquid refrigerant return line
56 56  siphon
Claims

1. Refrigerating system (2) comprising:
   a refrigerating cycle having a compressor (4), a condenser (6), a collecting
   container (10), an expansion device (16), an evaporator (18) and refrigerating
   circuits circulating a refrigerant therethrough;
   a by-pass line (20) comprising a by-pass valve (22), the by-pass line (20)
   connecting the gas space of the collecting container (10) with the suction line of
   the compressor (4); and
   a control unit that in operation allows switching between normal operation
   of the refrigerating cycle and refrigerant collecting operation in which the by-
   pass valve (22) is open, the condenser is heated by hot gas and reduces the li-
   quefying pressure in the condenser (6) such that the remaining liquid refrige-
   rant in the condenser (6) is evaporated and led into the collecting container
   (10).

2. Refrigerating system (24; 42) comprising:
   a refrigerating cycle having a compressor (4), a condenser (6), a collecting
   container (10), an expansion device (16), an evaporator (18) and refrigerating
   circuits circulating a refrigerant therethrough;
   a liquefying set (34; 44) connected to the collecting container (10); and
   a control unit that in operation allows switching between normal operation
   of the refrigerating cycle and refrigerant collecting operation in which the lique-
   fying set (34; 44) cools the collecting container (10) and reduces the tempera-
   ture in the condenser (6) below the ambient temperature thereby evaporating
   the remaining liquid refrigerant in the condenser (6) and leading it into the col-
   lecting container (10).

3. Refrigerating system (42) of claim 2,
   wherein the liquefying set (44) comprises an additional compressor (48), an
   additional condenser (50) and an additional expansion device (52), and
wherein, in the refrigerant collecting operation, gaseous refrigerant is sucked from the gas space of the collecting container (10) by the additional compressor (48), condensed by the additional condenser (48) and fed back into the liquid space of the collecting container (10).

4. Refrigerating system (42) of claim 3,
   wherein a siphon (56) is provided in the liquid refrigerant return line (54) of the liquifying set (44).

5. Refrigerating system (24) of claim 2,
   wherein the liquifying set (34) is connected to the collecting container (10) by means of a heat exchanger (28).

6. Refrigerating system (24) of claim 5,
   wherein the liquifying set (34) comprises an additional compressor (36), an additional condenser (38) and an additional expansion device (40).

7. Refrigerating system (24) of claim 5 or 6,
   wherein, in the refrigerant collecting operation, gaseous refrigerant flows from the gas space of the collecting container (10) to the heat exchanger (28) through a gaseous refrigerant line (26), is condensed in the heat exchanger (28) against the refrigerant of the liquifying set (34), and is fed back into the liquid space of the collecting container (10) through the liquid refrigerant return line (30).

8. Refrigerating system (24) of claim 7,
   wherein a siphon (32) is provided in the liquid refrigerant return line (30) of the liquifying set (34).

9. Refrigerating system (2; 24; 42) of any of the preceding claims,
   wherein the collecting container (10) is provided with a refrigerant fill level measuring unit (12).
10. Refrigerating system (2; 24; 42) of any of the preceding claims, wherein at least one valve (14) is provided for allowing switching between normal operation and refrigerant collecting operation.

11. Refrigerating system (2; 24; 42) of any of the preceding claims, wherein a valve (14) is arranged in flowing direction before the expansion device (16).

12. Refrigerating system (2; 24; 42) of any of the preceding claims, wherein a valve (8) is arranged behind the condenser (6).

13. Method for operating a refrigerating system (2) in a refrigerant collecting operation, the refrigerating system (2) comprising a refrigerating cycle having a compressor (4), a condenser (6), a collecting container (10), an expansion device (16), an evaporator (18) and refrigerating circuits circulating a refrigerant therethrough, the method comprising the steps of:
   (a) running the compressor (4);
   (b) connecting the gas space of the collecting container (10) with the suction line of the compressor (4) via a by-pass valve (22); and
   (c) heating the condenser by hot gas and keeping the liquefying pressure in the condenser (6) so low that no condensation is effected in the condenser (6) thereby evaporating the remaining liquid refrigerant in the condenser (6) and leading it into the collecting container (10).

14. Method for operating a refrigerating system (24; 42) in a refrigerant collecting operation, the refrigerating system (2) comprising a refrigerating cycle having a compressor (4), a condenser (6), a collecting container (10), an expansion device (16), an evaporator (18) and refrigerating circuits circulating a refrigerant therethrough, the method comprising the steps of:
   (a) running the liquifying set (34;44) thereby cooling the collecting container (10) and reducing the temperature in the condenser (6) below the ambient temperature such that the remaining liquid refrigerant in the condenser (6) is evaporated and led into the collecting container (10).
15. Method of claim 13, further comprising the following step to be carried out after step (a):
closing a valve (14) positioned in flowing direction before the evaporator (18); and
sucking off the refrigerant remaining between the valve (14) and the compressor (4) by the compressor (4).

16. Method of claim 14, further comprising the following step to be carried out before or during step (a):
running the compressor (4);
closing a valve (14) positioned in flowing direction before the evaporator (18);
sucking off the refrigerant remaining between the valve (14) and the compressor (4); and
switching off the compressor (4).

17. Method of claim 14 or 16, further comprising the step of effecting, in a heat exchanger (28), heat exchange between refrigerant from the collecting container (10) and the expanded refrigerant of the liquifying set (34).

18. Method of any of claims 13 to 17, further comprising the step of measuring the refrigerant fill level in the collecting container (10).